Psychosocial Determinants of Relocation in Survivors of the 1999 Earthquake in Turkey

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Abstract: Large-scale earthquakes in urban areas displace many people from their homes. This study examined the role of conditioned fears in determining survivors' tendency to live in shelters after the 1999 earthquake in Turkey. A total of 1655 survivors living in prefabricated housing compounds or residential units in the epicenter zone were screened using a reliable and valid instrument. Among participants whose houses were rendered uninhabitable during the earthquake 87.7% relocated to shelters, whereas others remained in the community by moving to a new house. In contrast, 38.7% of the participants whose houses were still inhabitable after the earthquake lived in the shelters. Relocation was predicted by behavioral avoidance, material losses, and loss of relatives. These findings suggested that a multitude of factors played a role in survivors' displacement from their houses and the elevated rates of mental health problems could constitute a cause rather than an effect of relocation.

Key Words: Relocation, natural disaster, earthquake, posttraumatic stress disorder, fear, avoidance.

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Of all natural disasters, large-magnitude earthquakes in urban areas are almost unique in their ability to cause large-scale human suffering and property loss (U.S. Geological Survey, 1999). Exposure to earthquakes is often associated with increased psychological problems, most notably posttraumatic stress disorder (PTSD) and depression (e.g. Armenian et al., 2000; Başoğlu et al., 2004). Research suggests that displacement after disasters aggravates psychological problems in survivors (Norris et al., 2002). A few studies that investigated this issue in earthquake survivors yielded mixed results. In a series of studies, Bland et al. (1996, 1997, 2005) reported increased psychological distress and PTSD symptoms for *permanently* relocated survivors exposed to 1983–1984 earthquakes in Italy. The sample of this study comprised only male factory workers who were not representative of the entire population in terms of trauma severity. Furthermore, the conclusion of increased PTSD symptoms (Bland et al., 2005) was based on the presence of only 2 PTSD symptoms (intrusive thoughts or nightmares). In 2 studies (Najarian et al., 1996, 2001) of adult and child survivors of the 1988 Armenian earthquake, relocation was associated with higher rates of depression but comparable rates of PTSD. These findings were based on 2 small convenience samples ($n \cong 25$ in each group), one involving only female adult survivors. In another study (Kılıç et al., 2006) after the 1999 earthquake in Turkey, compared with a nonrelocated group of survivors, the relocated group had significantly higher rates of PTSD but similar rates of depression. In regression analyses, however, relocation predicted depression but not PTSD. The fact that the nonrelocated group was not drawn from among survivors living in the earthquake region makes it difficult to interpret these findings. The methodological limitations of these studies and the diversity of findings preclude any conclusions regarding the mental health effects of relocation in earthquake survivors.

A common problem in studies of this issue concerns the lack of a clear definition of relocation. In studies of Bland et al., (1996, 2005) the effect of relocation was assessed after survivors returned to the earthquake region and permanent relocation meant not residing in the same house where survivors were exposed to earthquakes. In Najarian et al. (1996, 2001) studies relocation occurred within the affected region, from the epicenter to temporary accommodation units in a city with relatively low-earthquake exposure. In Kılıç et al. (2006) study relocation meant migration to a city without earthquake-exposure. As stated before, the nonrelocated group was not drawn from among survivors in the earthquake region. These survivors experienced the earthquake near the epicenter during a visit and 88.5% of them returned to their original residence outside earthquake region within 1 week after the disaster. The lack of a clear definition of relocation in the context of earthquake trauma complicates the assessment of its mental health effects.

Devastating earthquakes displace many survivors for various reasons to various places. Destruction of homes leads many survivors to relocate either to temporary shelters or to undamaged buildings within an earthquake region, whereas it leads some others to migrate and settle out of the affected region. Internal displacement within an earthquake region

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and migration out of that region may have different mental health implications. Survivors displaced within an earthquake region continue to be exposed to postearthquake stressors, such as aftershocks, collapsed or damaged buildings, shattered lives, and disrupted living conditions due to destruction of the infrastructure in the region, whereas survivors who migrate out of the region are not exposed to such stressors. This may explain why in some studies (Najarian et al., 1996, 2001) that used samples drawn within the earthquake region relocation did not yield different rates of PTSD. The mental health effects of relocation need to be examined in more clearly defined samples taking into account the diversity of potential postdisaster stressors experienced by the survivors.

Some authors (Bland et al., 1997; Kılıç et al., 2006) argued that the adverse mental health effects of relocation are mediated through social network disruption. Several sources of bias cast doubt on the validity of their conclusion. Relocated survivors might have suffered more severe trauma than nonrelocated survivors, a factor rarely taken into account in comparisons. In many cases relocation is due to the collapse of a house and loss of financial resources. The collapse of house is frequently associated with entrapment under rubble and loss of family members. As many stressors occur concurrently in earthquake trauma or are causally related, the mental health effects of relocation need to be examined while controlling for the effects of other related stressors. Furthermore, although many survivors are displaced due to the destruction of their houses, others avoid staying at home even if the building is safe and inhabitable. The uncontrollable and unpredictable nature of the initial shock and subsequent hundreds of aftershocks induce pervasive conditioned fears (Başoğlu et al., 2002) among survivors, leading to escape and avoidance of a wide range of situations. Although survivors avoid situations that act as reminders of events during the initial shock, in many cases avoidance is in relation to those situations perceived as dangerous in case of an earthquake, such as concrete buildings. Such pervasive fears are strongly associated with a sense of helplessness, which has been found to be the strongest predictor of earthquake-related PTSD and depression (Şalcıoğlu, 2004). These findings suggest that elevated rates of mental health problems among displaced survivors might be a cause rather than an effect of relocation.

The aim of the present study was to investigate some of the factors that led survivors to relocate within the epicenter region after the 1999 earthquakes in Turkey. We used data from our 2 field surveys (Başoğlu et al., 2002; Şalcıoğlu et al., 2003) conducted in survivor shelters and an epidemiological study (Başoğlu et al., 2004) conducted mainly in the residential units in the community. In both samples survivors' houses sustained varying degrees of damage. Survivors with uninhabitable houses either moved to shelters or to a new building in the community, whereas survivors with inhabitable houses either continued to stay in their own house or relocated to shelters. This composition represented to a large extent possible relocation patterns within an earthquake region and allowed the study of some of the factors that led survivors to relocate to shelters. We expected that the degree of trauma exposure, material losses, and traumatic stress would be associated with relocation to shelters. We also tested the hypothesis whether avoidance of trauma reminders would be a significant predictor of relocation to shelters when the effects of trauma exposure and loss variables were controlled for.

METHODS

Participants

On August 17, 1999, an earthquake of magnitude 7.4 on the Richter scale occurred in the densely populated northwestern part of Turkey, which caused 17,123 deaths and 43,953 injuries. An estimated 214,000 residential units were reduced to rubble or suffered structural damage leaving about more than 250,000 people homeless (U.S. Geological Survey, 1999). As a temporary solution to emergency shelter needs, the Turkish Government and national and international relief agencies launched temporary prefabricated housing projects throughout the earthquake region. The government also offered financial rental aid to homeless survivors who wished to remain in the community. Although some families preferred rental aid, others relocated to prefabricated housing compounds.

The data presented in this article were collected during a 5-year outreach treatment delivery program, which involved screening of survivors to identify those with traumatic stress problems and offer them treatment. Participants of this study were drawn from among survivors who participated in 2 field surveys (Başoğlu et al., 2002; Şalcıoğlu et al., 2003) in 5 prefabricated housing sites and an epidemiological study (Başoğlu et al., 2004) conducted in residential units in the epicenter region. The details of the sampling procedures could be found in the main reports. The 5 prefabricated housing sites were scattered from 3 to 16 km from the epicenter and provided shelter for 2342 adult survivors. In each camp the project workers visited the prefabricated houses consecutively and, if they could not find anyone in a particular house, moved on to the next one. A total of 1173 (50% of all camp residents) survivors were screened between March 2000 and November 2001, a mean of 1.3 years after the earthquake (SD = 0.5, range = 0.5–2.3). The epidemiological study (Başoğlu et al., 2004) was conducted in Değirmendere, a town situated 3 km from the epicenter. A sample of 1000 households was randomly selected from the preearthquake registry of residential units (N = 10,500), of which 530 were screened. The inhabitants of 25 households were found in shelters. Data collection took place between July 2000 and March 2001, a mean of 1.2 years after the earthquake (SD = 0.2, range = 0.9–1.6).

Screenings for each study were conducted by psychologists, psychology undergraduate students, and other university students who were trained in the administration of the scales. No inclusion criteria were employed, except for severe physical or mental/cognitive impairment that would significantly interfere with assessment. For illiterate survivors (n = 85, 5%) scale items were read out and responses were noted. Because the studies were conducted as part of an outreach treatment delivery program, only verbal consent was obtained for assessment.

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Measures

The assessment was conducted using the Screening Instrument for Traumatic Stress in Earthquake Survivors (SITSES; Başoğlu et al., 2001), which consisted of 3 parts. Part I, Survivor Information Form, was a 28-item form that yielded information on demographic, personal history and trauma characteristics. Part II, Traumatic Stress Symptom Checklist (TSSC), included 17 DSM-IV PTSD and 6 depression symptoms in the last week, all measured on an intensity scale (0, *not at all bothered*; 3, *very much bothered*). Part III, Severity of Disability Scale, involved 2 items measuring the global severity of distress and the degree of disability in work, family, and social functioning (0, *not at all*; 3, *extremely*).

The TSSC was validated (Başoğlu et al., 2001) against the Clinician-Administered PTSD Scale (CAPS; Blake et al., 1996) and the major depressive episode module of the Structured Clinical Interview for DSM-IV (First et al., 1996). The scale had a sensitivity of 81%, specificity of 81%, and correct classification rate of 81% with respect to PTSD diagnosis. The respective figures for diagnosis of depression were 83%, 73%, and 77%. The factorial stability of the TSSC was confirmed in 4 samples involving 3382 earthquake survivors (Başoğlu et al., 2002; Livanou et al., 2002; Şalcıoğlu et al., 2003, 2007a). The scale showed satisfactory predictive validity in community samples (Başoğlu et al., 2002, 2004; Şalcıoğlu et al., 2003, 2007) and treatment seekers (Livanou et al., 2002) and sensitivity to clinical change (Başoğlu et al., 2003a,b, 2005). The scale thus proved to be a useful measure of traumatic stress in earthquake survivors.

Data Analyses

Data from the camps were pooled for analyses. To test the study hypotheses, 4 groups were identified: (a) survivors with uninhabitable houses who relocated to shelters (group I), (b) survivors with uninhabitable houses who moved to a new house (group II), (c) survivors with inhabitable houses who remained in their houses (group III), and (d) survivors with inhabitable houses who relocated to shelters (group IV). The definition of the status of the survivors' house was based on official reports from government experts, which defined a house as uninhabitable if it collapsed during the earthquake or sustained "moderate" to "severe" structural damage (e.g. in supporting columns). Forty-eight cases (3%) were excluded from the analyses, because the extent of damage to their house was unknown. Between-groups differences were analyzed using χ^2 test for categorical and *t*-tests for continuous variables. As multiple comparisons might lead to type I error, the significance level for between-group comparisons was set to 0.003 after Bonferroni adjustment. Logistic regression analyses (simultaneous entry method) were conducted to examine the predictors of relocation to shelters.

RESULTS

Sample Characteristics

Table 1 shows sample characteristics and between-groups comparisons. Of the 1066 participants whose houses were rendered uninhabitable during the earthquake 87.7% moved to prefabricated housing compounds, whereas others

TABLE 1. Sample Characteristics and Between-Groups Comparisons

	Group I (N = 935)	Group II (N = 131)	Group III (N = 361)	Group IV (N = 228)	Comparisons
Background variables					
Gender (female); *n* (%)	599 (64.1)	67 (51.1)	190 (52.6)	140 (61.4)	$\chi^2(3) = 19.1, p < 0.001$
Age; Mean (*SD*)	36.4 (14.4)	39.7 (14.7)	42.1 (16.6)	36.6 (13.4)	$F(3, 1650) = 13.9, p < 0.001$
Education (1–6)[a]	3.9 (1.2)	4.5 (1.4)	4.2 (1.2)	3.6 (1.3)	$F(3, 1630) = 17.1, p < 0.001$
Marital status (married); *n* (%)	627 (67.1)	91 (69.5)	253 (70.1)	175 (76.8)	$\chi^2(3) = 8.1, p = 0.04$
Past psychiatric illness; *n* (%)	102 (10.9)	5 (3.8)	30 (8.3)	25 (11.0)	$\chi^2(3) = 8.1, p = 0.04$
Psychiatric illness in the family; *n* (%)	73 (7.8)	3 (2.3)	14 (3.9)	17 (7.5)	$\chi^2(3) = 11.0, p = 0.02$
Previous trauma experience; *n* (%)	185 (19.8)	29 (22.1)	75 (20.8)	58 (25.4)	$\chi^2(3) = 3.6, p = 0.31$
Trauma exposure and loss variables					
Trapped under rubble; *n* (%)	149 (15.9)	15 (11.5)	2 (0.6)	3 (1.3)	$\chi^2(3) = 90.3, p < 0.001$
Participated in rescue work; *n* (%)	333 (35.6)	44 (33.6)	90 (24.9)	82 (36.0)	$\chi^2(3) = 14.5; p = 0.002$
Lost first-degree relatives; *n* (%)	127 (13.6)	13 (9.9)	13 (3.6)	21 (9.2)	$\chi^2(3) = 28.2, p < 0.001$
Lost second-degree relatives; *n* (%)	458 (49.0)	45 (34.4)	104 (28.8)	110 (48.2)	$\chi^2(3) = 52.7, p < 0.001$
Lost friends and / or neighbors; *n* (%)	808 (86.4)	114 (87.0)	295 (81.7)	203 (89.0)	$\chi^2(3) = 7.3, p = 0.06$
Material loss; *n* (%)	686 (73.4)	76 (58.0)	93 (25.8)	77 (33.8)	$\chi^2(3) = 295.9, p < 0.001$
Intensity of fear (0–4)[b]; Mean (*SD*)	3.1 (1.2)	2.9 (1.3)	2.7 (1.3)	3.2 (1.1)	$F(3, 1648) = 12.9, p < 0.001$
Psychiatric outcome					
PTSD; *n* (%)	432 (46.2)	34 (26.0)	69 (19.1)	107 (46.9)	$\chi^2(3) = 96.0, p < 0.001$
Comorbid depression; *n* (%)	301 (32.2)	20 (15.3)	48 (13.3)	75 (32.9)	$\chi^2(3) = 60.6, p < 0.001$

Note: Group I, House uninhabitable, relocated to shelters; Group II, House uninhabitable, moved to a new house; Group III, House inhabitable, remained in the house; Group IV, house inhabitable, relocated to shelters.

[a]1, literate; 2, primary school; 3, secondary school; 4, high school; 5, university; 6, postgraduate studies.

[b]0, none; 1, slight; 2, marked; 3, severe; 4, extremely severe.

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remained in the community by moving to a new house. On the other hand, 38.7% of the 589 participants whose houses survived the earthquake with minimal or no damage relocated to shelters. There were more women in shelters (groups I and IV) than in residential units (groups II and III). This was probably due to the fact that men in shelters were mostly at work during the day and on weekdays when the staff carried out assessments. This problem was tackled during the epidemiological study by prolonging work-hours and working on weekends. Survivors in the shelters had lower education than those living in houses, reflecting in part that people of lower socio-economic status were more severely affected by the disaster. The 4 groups were similar on the remaining background characteristics.

Among survivors who lost a house, those relocated to shelters seemed to have been exposed to more earthquake-related stressors than those who moved to a new house. These survivors (groups I and II) reported higher instances of entrapment under rubble and more material losses than survivors with inhabitable houses (groups III and IV). Homeless survivors living in the shelters (group I) reported the highest rate of loss of first-degree relatives. Among survivors with inhabitable houses those who remained in their houses seemed to have been exposed to fewer stressors than all groups, whereas those in shelters seemed to fall somewhere in between the 2 groups of survivors with uninhabitable houses on the continuum of exposure to traumatic stressors. In fact, the latter group lost as many first-degree relatives as and more second-degree relatives than those with uninhabitable houses living in residential units (group II). They were also similar to homeless survivors in terms of the frequency of participation in rescue work after the disaster.

Survivors in the shelters reported higher levels of fear during the earthquake and had substantially higher rates of PTSD and depression than survivors in the residential units. Taking into account the fact that women predominated in the shelters, the adjusted rates for PTSD and depression were, respectively, 42.8% and 30.0% for homeless survivors, and 43.7% and 30.4% for the remainder. These figures were not substantially different from the unadjusted ones. Among survivors living in the residential units, those who moved to a new house reported higher rates of PTSD but similar rates of depression and intensity of fear compared with those who remained in their undamaged houses.

Factors Associated With Relocation

A logistic regression analysis was conducted using the relocation status as the dependent variable (1, *not relocated to shelters*; 2, *relocated to shelters*). The independent variables included age, gender, education, marital status, past psychiatric illness, family history of psychiatric illness, past trauma experience, having been trapped under rubble, loss of first- or second-degree relatives, loss of friends and/or neighbors, monetary loss, participation in rescue work, fear during the earthquake, and TSSC total scores. Time since trauma was not included as a predictor to avoid potential confounding that might arise from the fact that camps and houses were screened at different time periods. The regression model, which accounted for 29% of the variance, was reliable (χ^2 = 359.0, df = 15, $p < 0.001$) and provided a good fit (Hosmer and Lemeshow χ^2 = 7.0, df = 8, p = 0.54). Prediction success was better for relocated survivors (90.7%) than nonrelocated ones (42.5%), with overall success rate of 76.2%. Material loss (OR = 3.32, 95% CI = 2.56–4.30, $p < 0.001$), loss of second-degree relatives (OR = 1.76, 95% CI = 1.36–2.28, $p < 0.001$), lower education (OR = 0.73, 95% CI = 0.65–0.82, $p < 0.001$), younger age (OR = 0.96, 95% CI = 0.95–0.97, $p < .001$), and higher TSSC scores (OR = 1.03, 95% CI = 1.02–1.04, $p > 0.001$) predicted relocation to shelters.

To examine further which factors led survivors to live in shelters in more homogenous groups of survivors with uninhabitable (groups I and II) and inhabitable (groups III and IV) houses, 2 separate regression analyses were conducted. Individual TSSC items, rather than total TSSC scores, were used to scrutinize the contribution of each PTSD and depression symptom to the prediction model. In the analysis involving survivors with uninhabitable houses the regression

TABLE 2. Predictors of Relocation to Shelters

	Survivors With Uninhabitable Houses (n = 1066)			Survivors With Inhabitable Houses (n = 589)		
	OR	95% CI	p	OR	95% CI	p
Age	0.96	0.94–0.98	.001	0.96	0.94–0.97	.001
Gender (male)	—	—	—	0.56	0.31–1.00	0.05
History of psychiatric illness	3.43	1.11–10.59	0.03	—	—	—
Education	0.66	0.54–0.81	0.001	0.64	0.52–0.78	0.001
Material loss	1.94	1.21–3.10	0.01	—	—	—
Loss of second-degree relatives	1.71	1.08–2.70	0.02	1.86	1.17–2.95	0.001
Avoidance of trauma reminders	1.97	1.47–2.63	0.001	2.07	1.55–2.75	0.001
Flashback	—	—	—	0.61	0.44–0.83	0.01
Nightmares	—	—	—	1.48	1.09–2.00	0.02
Sense of foreshortened future	—	—	—	0.76	0.57–1.00	0.05
Startle responses	0.64	0.47–0.88	0.01	—	—	—
Sleeping difficulty	0.73	0.55–0.96	0.02	—	—	—

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model explained 23% of the variance ($\chi^2 = 119.8$, $df = 37$, $p < 0.001$ with Hosmer and Lemeshow $\chi^2 = 4.15$, $df = 8$, $p = 0.84$) and correctly classified 87.9% of the participants. Significant predictors (see Table 2) were avoidance, lower level of education, material loss, loss of relatives, past psychiatric illness, younger age, and less startle and sleeping difficulty. In the regression model involving survivors with inhabitable houses the regression model accounted for 41% of the variance ($\chi^2 = 198.1$, $df = 37$, $p < 0.001$ with Hosmer and Lemeshow $\chi^2 = 14.0$, $df = 8$, $p = 0.08$) and correctly classified 75.0% of the survivors. Significant predictors (see Table 2) were behavioral avoidance, lower level of education, loss of second-degree relatives, younger age, fewer flashbacks, and more nightmares. Male gender and less sense of foreshortened future showed marginal associations ($p = 0.05$) with relocation to shelters.

DISCUSSION

The study groups represented the pattern of relocation within an affected region to a large extent. The majority of survivors (88%) were displaced from their houses due to destruction and they moved to prefabricated housing compounds. These survivors were exposed to more earthquake stressors than those who chose to move into undamaged buildings, but the differences seemed to be marginal. For these survivors relocation to shelters was about 2 times more likely with an increase in behavioral avoidance and material loss, whereas it was also highly associated with past psychiatric illness. The latter finding possibly reflected a predisposition to fear and anxiety among survivors with a history of psychiatric illness. The prediction between lower education and relocation to shelters suggested that survivors from a lower socio-economic background were more severely affected by the earthquake. Among all trauma exposure variables only loss of second-degree relatives emerged as a significant predictor. Although this variable reflected the distressing experience of the sudden and untimely death of loved ones, it also carried information on the extent of exposure to grotesque scenes after the disaster. These findings supported the hypotheses. The rather unexpected association between relocation and lower intensity of startle responses and sleeping problems could be attributed to survivors' relative sense of security resulting from living in prefabricated houses.

Interestingly, 39% of those survivors whose houses survived the earthquake with minimal or no damage lived in shelters. These survivors fell somewhere in between 2 groups of survivors with uninhabitable houses on the continuum of exposure to traumatic stressors; and their initial fear response during the earthquake was as strong as those severely traumatized homeless survivors in the camps. This level of traumatization seemed to be a significant factor for them to avoid living in concrete buildings. Indeed, in the prediction analysis phobic avoidance was the strongest predictor of relocation for these survivors, whereas severity of trauma exposure (e.g., loss of relatives, lower education) also contributed to the model. These results provided further support to the hypotheses. The marginally significant associations between relocation and less distress related to flashbacks and sense of foreshortened future again reflected survivors' relative sense of security and the presence of fewer trauma reminders in the shelters. Higher distress related to nightmares possibly reflected the effects of the original trauma. The marginally significant prediction of male gender ($p = 0.05$) was an unexpected finding and possibly reflected a sampling variation.

The prediction between behavioral avoidance and relocation to shelters reflected the strong conditioning effects of the initial earthquake and subsequent aftershocks. As noted earlier, pervasive conditioned fears were associated with a sense of helplessness, which was a strong predictor of earthquake-related PTSD and depression (Şalcıoğlu, 2004). Similar findings were also reported for war-related PTSD and depression (Başoğlu et al., 2005). Furthermore, among all PTSD symptoms self-reported avoidance of trauma reminders was the strongest predictor of a clinician's diagnosis of PTSD about 4 months after the earthquake (Başoğlu et al., 2001). These findings might explain in part why survivors living in shelters had more severe traumatic stress symptoms than survivors living in a house. It is also important to note that living in shelters reinforces more avoidance, which in turn prolongs traumatic stress reactions. We know from our field experience that living in a concrete building sometimes leads to self-instigated exposure to feared situations (e.g., staying alone in the house by day or at night, taking a bath alone in the house, being or sleeping in the dark, etc.) and such exposure is highly effective for recovery from traumatic stress problems in earthquake survivors (Başoğlu et al., 2003a,b, 2005, 2007). Findings of a previous study (Şalcıoğlu et al., 2007a) showed that the PTSD rates tended to decline when survivors relocated from shelters to concrete houses. Moreover, exposure to aftershocks in a concrete building without severe consequences might lead to the extinction of conditioned fears and have resilience-building effects in survivors. This is consistent with evidence from our clinical trials showing that fear of earthquakes substantially decreased after exposure to simulated earthquake tremors in an earthquake simulator (Başoğlu et al., 2003a, 2007).

Some authors (Bland et al., 1997; Kılıç et al., 2006) argued that social network disruption was responsible for increased psychological problems in relocated survivors. Although we did not obtain information on social support in this study, in a previous report (Şalcıoğlu, 2004), both the impact of earthquake on social support and the level social support survivors received at the time of the assessment did not relate to depression and the latter negatively correlated with PTSD. The latter finding suggested that, although large-scale disasters often lead to disruption of social support networks, they also result in increased emotional support, particularly for survivors with higher trauma exposure. Postearthquake depression was found to be associated with bereavement (Livanou et al., 2002; Şalcıoğlu et al., 2003, 2007a) and loss of financial resources (Armenian et al., 2000; Bland et al., 1996; Şalcıoğlu, 2004). Depression was also related to fear of earthquakes and less sense of control over aftershocks (Şalcıoğlu, 2004), suggesting that in some cases depression results from helplessness generated by the effects of after-

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shocks. This is consistent with evidence showing that perceptions of uncontrollability play a central role in creating vulnerability to anxiety and depression (e.g. Alloy et al., 1990; Mineka, 1985; Mineka and Kelly, 1989).

The role played by behavioral avoidance in displacement of survivors to shelters has important mental health, social, economic, and political implications. Although shelters provide solution for accommodation needs of survivors they also have antitherapeutic effects. By reinforcing avoidance, they sustain fear and traumatic stress among survivors and pave the way for new fear acquisition through observational conditioning and instructional learning. In a previous report (Başoğlu et al., 2002) we noted that most survivor camps reinforced a "*culture of fear and avoidance*" and that the local authorities, many of whom experienced the earthquake themselves, colluded with this culture. Phobic avoidance not only leads many survivors to live under difficult conditions without any due, but also costs the government a substantial economic burden. A governmental report issued 6 months after the 1999 earthquake in Turkey indeed indicated that 58% of the 15,000 people relocated to temporary shelters had a safe and inhabitable house. Provision of temporary housing opportunities to survivors who have an undamaged house may also be perceived as an act of unfair distribution of aid, leading to a sense of injustice among survivors who suffered losses, a phenomenon commonly observed among earthquake survivors (Şalcıoğlu, 2004). Governmental policies therefore need to encourage survivors to resettle in their homes as soon as it is safe to do so.

The prevalence of fear among earthquake survivors and its central role in traumatic stress have important implications for postdisaster mental health policies. Our recent clinical trials (Başoğlu et al., 2003a,b, 2005, 2007) have shown that PTSD and depression in earthquake survivors can be effectively treated with a single session of control focused behavioral treatment, which targets the reduction of fear and phobic avoidance through mainly live exposure to feared situations. Reduced avoidance of trauma cues early in treatment leaded to subsequent improvement in all PTSD symptoms and lack of improvement in avoidance was associated with lack of improvement in 12 PTSD symptoms (Şalcıoğlu et al., 2007b). Our findings suggest that large-scale implementation of a mental health care model involving a brief intervention to reduce fear and avoidance could help survivors resettle to their houses. A fear-focused approach in preparedness efforts in earthquake-prone countries might also be useful in increasing resilience against future earthquakes.

Several limitations need to be taken into account in interpreting the results. First, a nonrandom sample of relocated survivors may limit the generalizibility of our results. Given the difficulties associated with conducting research in a postdisaster setting, random sampling from and within prefabricated housing sites was not feasible. However, there is no compelling reason to doubt a selection bias because we obtained a large sample from 5 fairly densely populated survivor camps scattered in a region of 3 to 15 km from the epicenter. Our sample did not include survivors who migrated out of the earthquake zone, but our findings suggest that survivors with higher fear and distress levels would avoid living in the affected region if they have the necessary means. Future research is needed to examine this issue in more detail. The retrospective and cross-sectional nature of the study design, a problem with all studies of this kind, is an additional limitation.

In conclusion, the findings of this study suggest that extent of trauma exposure, financial losses, earthquake-related fears and associated avoidance contribute to survivors' decision to relocate and that the elevated rates of mental health problems among relocated survivors may constitute a cause rather than an effect of relocation. As such they imply a venue of change in the direction for research of this issue. Although our results need to be confirmed in other samples of earthquake survivors, future studies need to pay closer attention to the evidence on the mechanisms of earthquake-related traumatic stress and the effects of disaster-related stressors in the examination of the psychological consequences of relocation per se.

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